



583 531

(43) International Publication Date
2 December 2004 (02.12.2004)

PCT

(10) International Publication Number
WO 2004/103894 A1

(51) International Patent Classification⁷: **C01B 3/02**,
3/26, 31/20

(21) International Application Number:
PCT/US2004/011576

(22) International Filing Date: 15 April 2004 (15.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/463,465 16 April 2003 (16.04.2003) US

(71) Applicant (for all designated States except US): **ENERGY
& ENVIRONMENTAL RESEARCH CENTER FOUN-
DATION, INC.** [US/US]; 15 North 3rd St., PO Box 9018,
Grand Forks, ND 58202-9018 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **TIMPE, Ronald**
[US/US]; 604 Stanford Road, Grand Forks, ND 58203
(US). **AULICH, Ted** [US/US]; 2615 Olive Street, Grand
Forks, ND 58201 (US).

(74) Agent: **JOHNSON, Bruce, A.**; Johnson & Associates, PO
Box 90698, Austin, TX 78709-0698 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

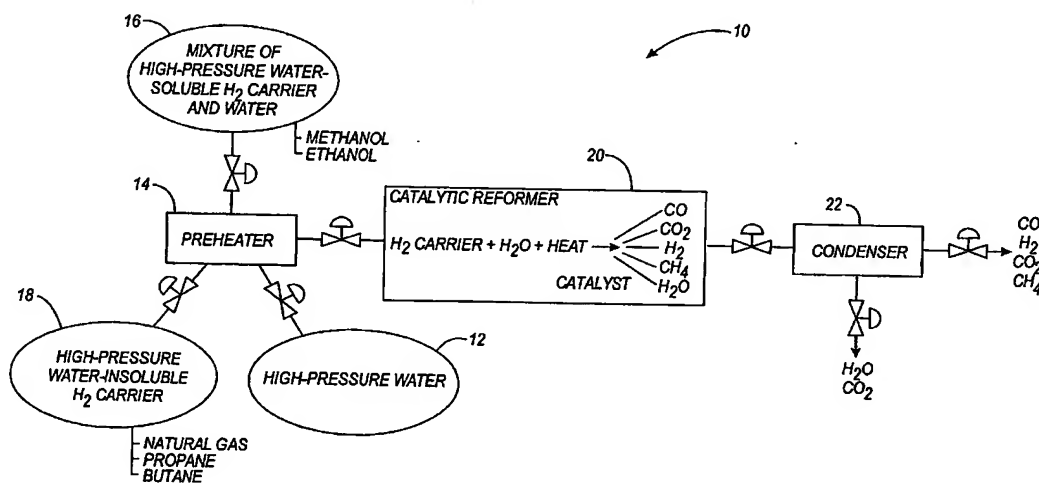
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,
GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: **PROCESS FOR PRODUCING HIGH-PRESSURE HYDROGEN**



(57) Abstract: A method and apparatus for use in producing high-pressure hydrogen from natural gas, methanol, ethanol, or other fossil fuel-derived and renewable hydrocarbon resources. The process can produce hydrogen at pressure ranging from 2000 to 12,000 pounds per square inch (psi) using a hydrogen feedstock (16, 18) high pressure water (12, 18), and an appropriate catalyst. Following making and heating in preheater (14), the catalyst reacts with the hydrogen feedstock (16, 18) and high pressure water (12, 18) in a catalytic reformer (20) maintained under desired temperature and pressure conditions. Reformate products exit reformer (200) and flow into condenser (22), in which water and a portion of the carbon dioxide product are condensed.